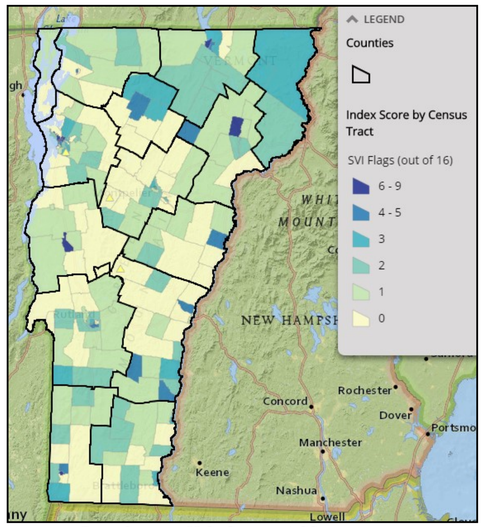
Social Vulnerability Index (SVI):

A Tool for Bringing Visibility to Vermont's Most Vulnerable Populations

Introduction

The Vermont Social Vulnerability Index (SVI) was originally prepared by the Vermont Department of Health as part of the Environmental Public Health Tracking program. According to the Vermont Department of Health, *social vulnerability* refers to "the resilience of communities when responding to or recovering from threats to public health." The SVI helps to identify which populations are most vulnerable and may need more assistance in the case of a threat to public health. The SVI was most recently produced by census tract, based upon U.S. Census ACS 5-year estimates from 2011-2015 (see Map 1). I chose to reproduce the SVI at the census block group level, to determine which block groups are most vulnerable. Vermont has 183 census tracts and 522 census block groups (1 of which is unpopulated). The original SVI was comprised of 16 measures spanning socioeconomic, demographic, and housing/transportation categories.

Map 1: Original Vermont Social Vulnerability Index by Census Tract



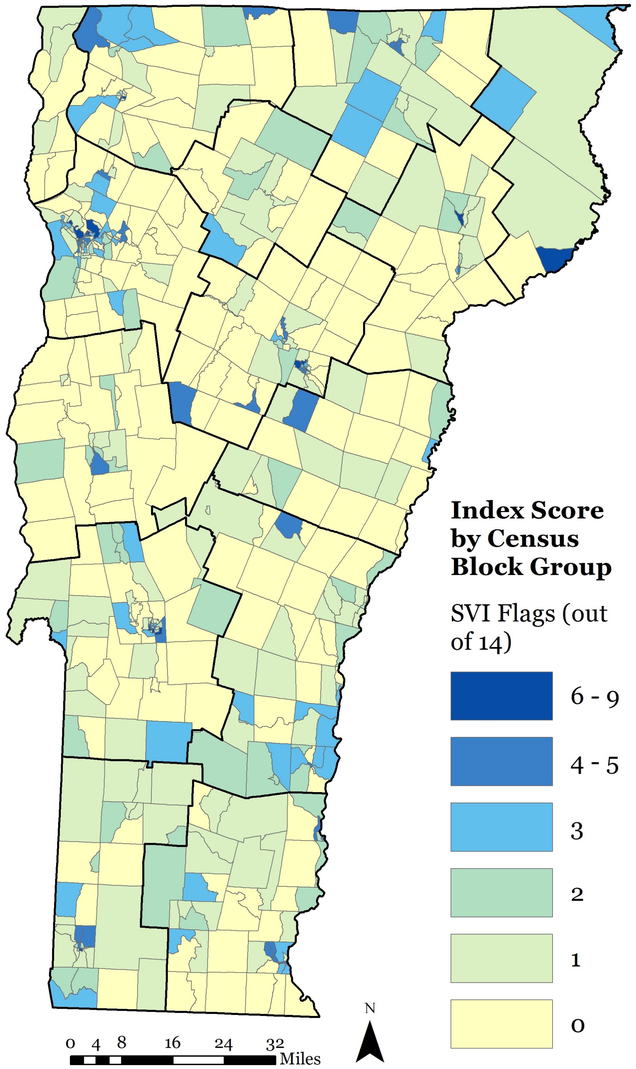
Data Source: U.S. Census ACS 2011-2015

Table 1: SVI Measures	
Measure	**Description**
1.) Poverty	Percent of families with income below the Federal poverty level
2.) Unemployment	Percent of population age 16 and over who are unemployed
3.) Income	Per capita income (in 2017 inflation-adjusted dollars)
4.) Education	Percent of population age 25 and over without a high school diploma
5.) Health Insurance	Percent of civilian noninstitutionalized population under age 65 without health insurance
6.) Children	Percent of population under age 18
7.) Elderly	Percent of population age 65 and over
8.) Single Parent	Percent of households with a child under age 18 where one spouse is not present
9.) Minority	Percent of total population that are Hispanic or non-white race
10.) Limited English	Percent of households that are limited English-speaking households
11.) Large Apartment Buildings	Percent of housing units in buildings with 10 or more units
12.) Mobile Homes	Percent of housing units that are mobile homes
13.) Crowding	Percent of housing units with more than one person per room
14.) No Vehicle	Percent of housing units with no vehicle available

Methodology

I was able to locate data for 14 of the original measures by census block group using U.S. Census ACS 5-year estimates from 2013-2017. The 14 vulnerability measures I examined are detailed in Table 1. If a census block group was in the 90th percentile of a particular measure, it received 1 SVI flag. I then calculated the total number of SVI flags per census block group. I did an Attribute Join between the SVI data and the VT 2000 census block group vector polygons layer in ArcMap. I then grouped the SVI flag count into 6 categories: 6-9, 4-5, 3, 2, 1, and 0 flags, and used Symbology to color-code them accordingly to match the original SVI map (see Map 2). I used Local Moran's I (a spatial cluster and outlier analysis tool) to determine if there was clustering of the most vulnerable census block groups (see Map 3).

Map 2: Vermont Social Vulnerability Index by Census Block Group



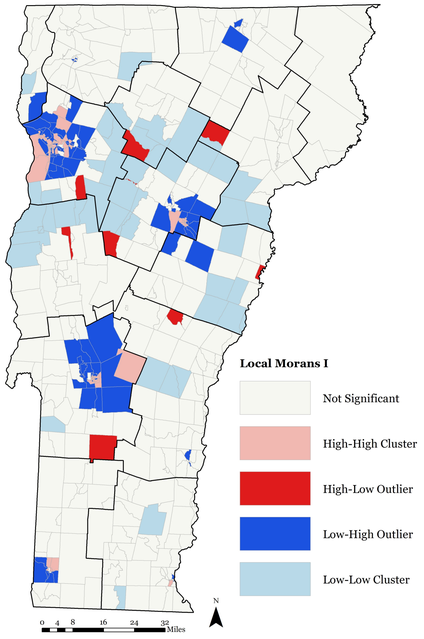
Data Sources: U.S. Census ACS 2013-2017; Vermont Open Geodata Portal

Findings

Table 2: SVI Flag Count		
SVI Flags	**Number of Census Tracts**	**Number of Census Block Groups**
6-9	11	19
4-5	13	36
3	17	55
2	37	74
1	48	139
0	57	198

The SVI flag count allows us to identify the most and least vulnerable Vermont populations by census block group, with most vulnerable shown by the darkest blue polygons. Table 2 shows the total SVI flag counts by both census tract and census block group, allowing for comparisons across the two models. The SVI identified 19 census block groups at the most vulnerable level (6-9 SVI flags). Creating the SVI at the census block group level allows for greater visibility and assistance for the most vulnerable populations than the SVI by census tract. The Local Moran's I analysis demonstrated that some (minimal) clustering does exist between the most vulnerable block groups, particularly around major cities including Burlington, Barre, and Rutland. The SVI is an important tool for planners and policymakers that helps to focus attention on particularly vulnerable populations so they can get the assistance they need.

Map 3: Local Moran's I



Data Sources: U.S. Census ACS 2013-2017; Vermont Open Geodata Portal

References

State of Vermont. "Vermont Open Geodata Portal," 2019. http://geodata.vermont.gov/.

Vermont Department of Health. "Social Vulnerability Index: A User's Guide," 2015. https://ahs-vt.maps.arcgis.com/apps/MapSeries/index.html?appid=9478be15d6d4410f8eef8d420711310b.

Vermont Department of Health. "Vermont Social Vulnerability Index (SVI)." Vermont Department of Health. Accessed May 6, 2019. https://ahs-vt.maps.arcgis.com/apps/MapSeries/index.html?appid=9478be15d6d4410f8eef8d420711310b.

Data Sources

U.S. Census ACS 5-year estimates 2013-2017; U.S. Census ACS 5-year estimates 2011-2015; Vermont Open Geodata Portal

Coordinate System: Vermont State Plane

Projection: Transverse Mercator

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